

# Preliminary performance plots for tracking review sims

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August 25, 2016

# Goal

Evaluate performance of sPHENIX tracking configurations using:

- Inner barrel of 3 maps layers copied from ALICE ITS upgrade configuration
- Intermediate tracker of 4 silicon strip layers (**or not**)
- Outer TPC tracker with 60 gas layers

The inner barrel and intermediate tracker are simulated using cylinder cell geometry.

# Macro location

The tracking setup macro is:

G4\_Svtx\_maps+IT+tpc.C

It is located in:

[https://github.com/adfrawley/macros/tree/QTG\\_macros/macros/g4simulations](https://github.com/adfrawley/macros/tree/QTG_macros/macros/g4simulations)

The number of layers of each subsystem can be varied by changing:

```
const int n_ib_layer = 3; // number of maps inner barrel layers  
const int n_intt_layer = 4; // number of int. tracker layers  
const int n_gas_layer = 60; // number of TPC layers
```

If you set “n\_intt\_layer = 0” you get maps + TPC only.

# Simulations

All simulations shown here use central Hijing events with 100 embedded pions each.

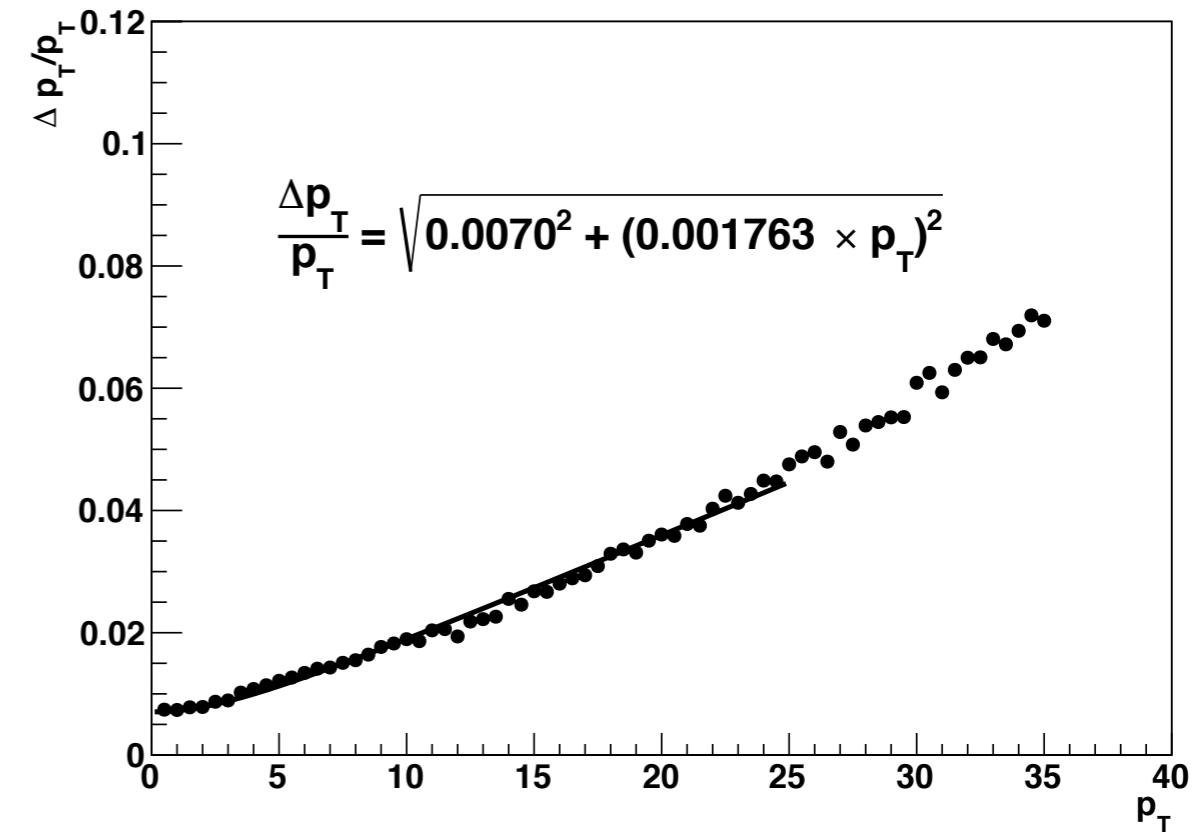
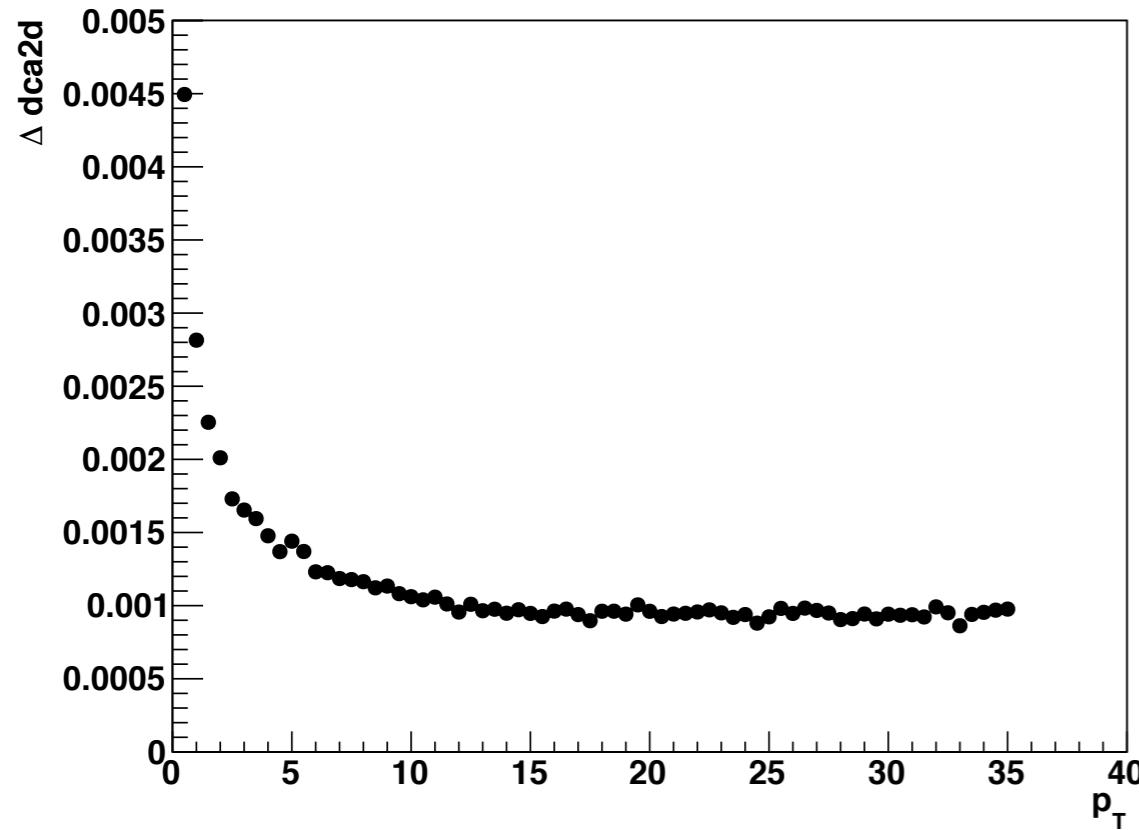
The embedded pions have quantized pT values from 0.5-50 GeV/c in steps of 0.5 GeV/c.

The pT and dca2d resolution plots are made from embedded pion tracks only.

The single track efficiency plots are made from embedded pions only, using a  $4\sigma$  cut on reconstructed pT.

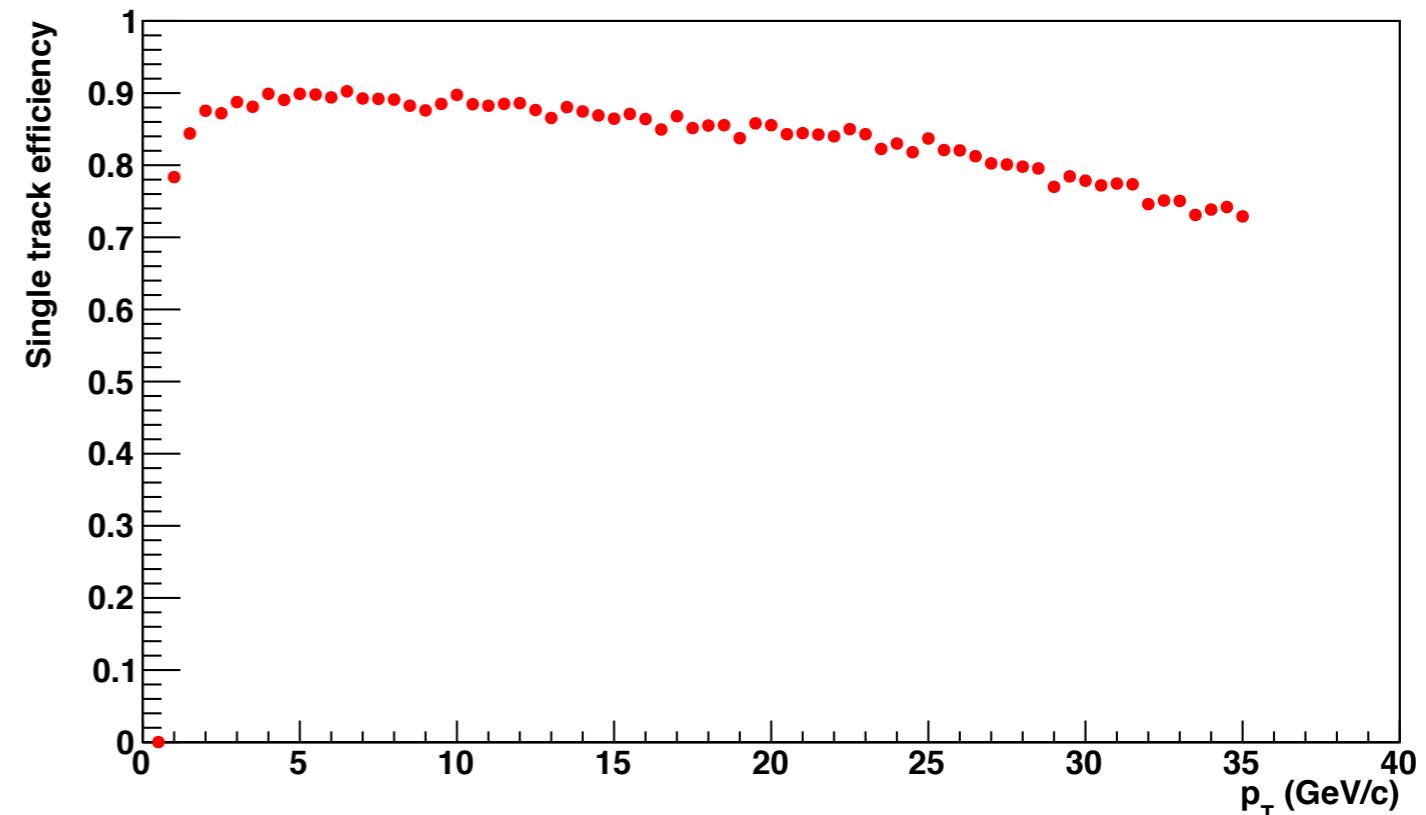
There are also DCA distributions and purity plots made with Hijing tracks only.

# Maps(3)+TPC(60) performance plots

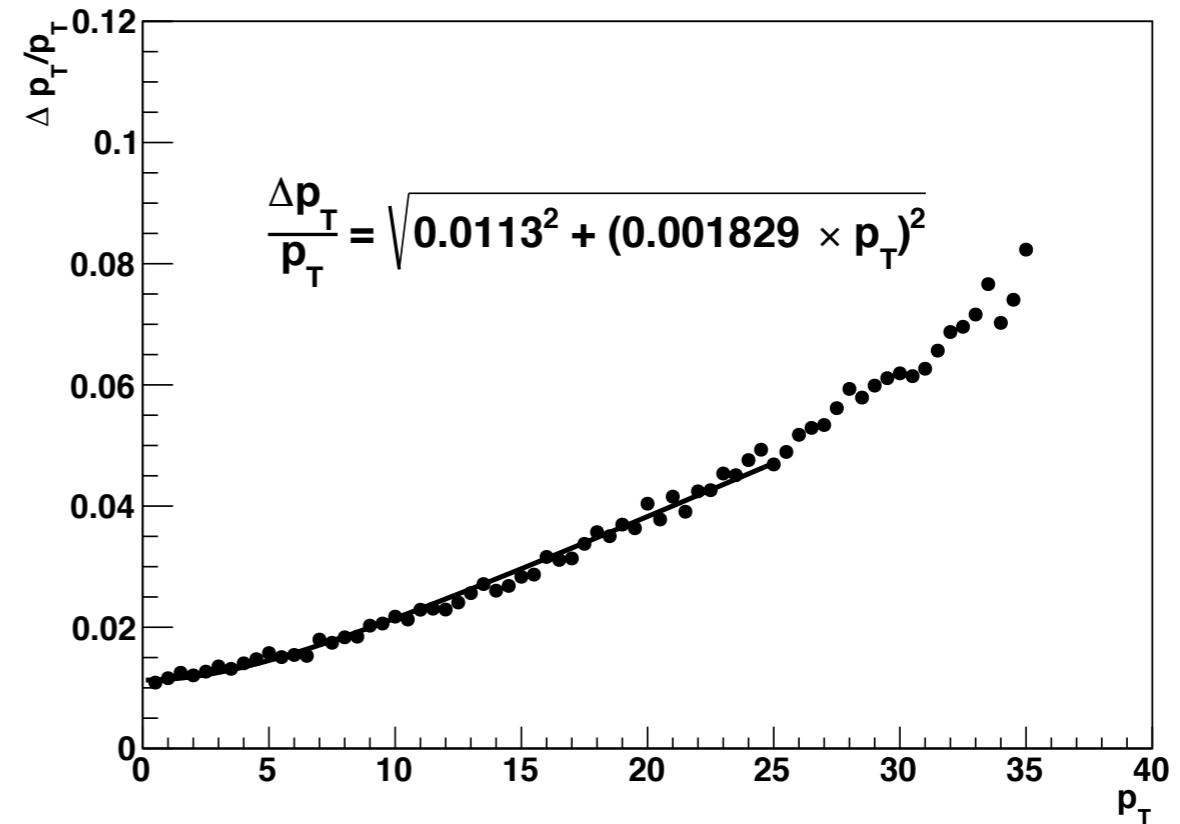
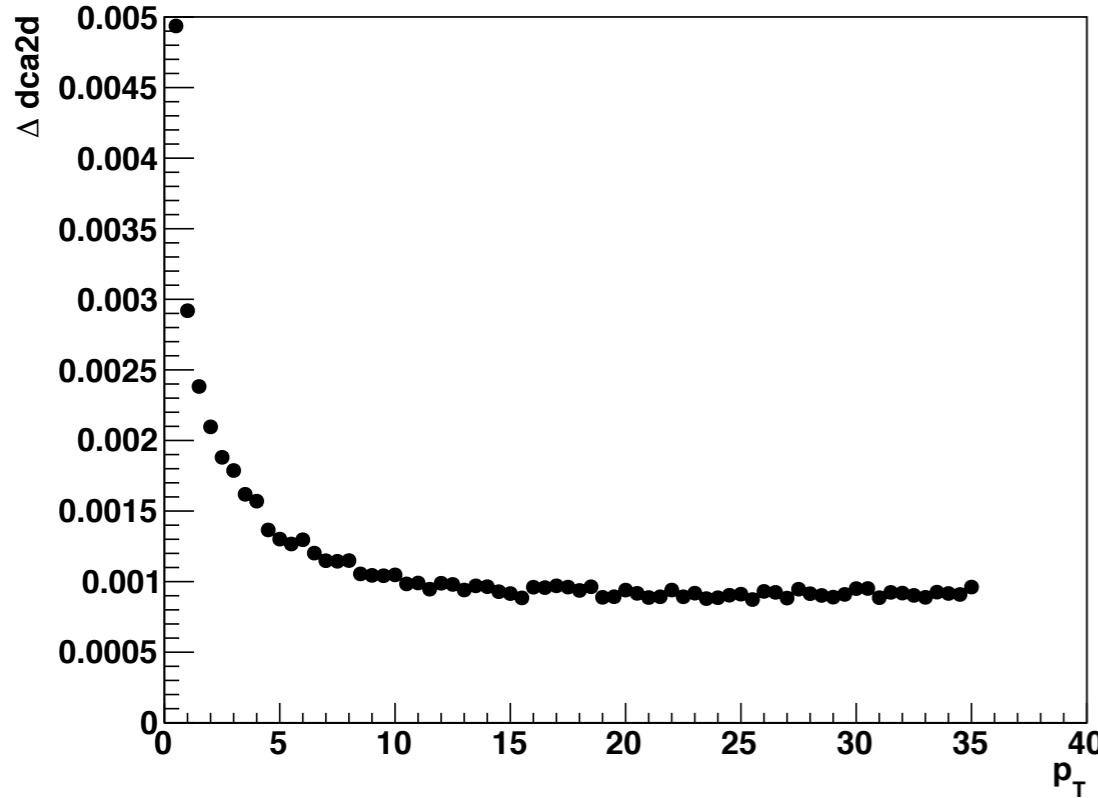


embedded pions only  
central Hijing  
+ 100 pions/event

quality < 1.5  
 $\Delta p_T < 4\sigma$

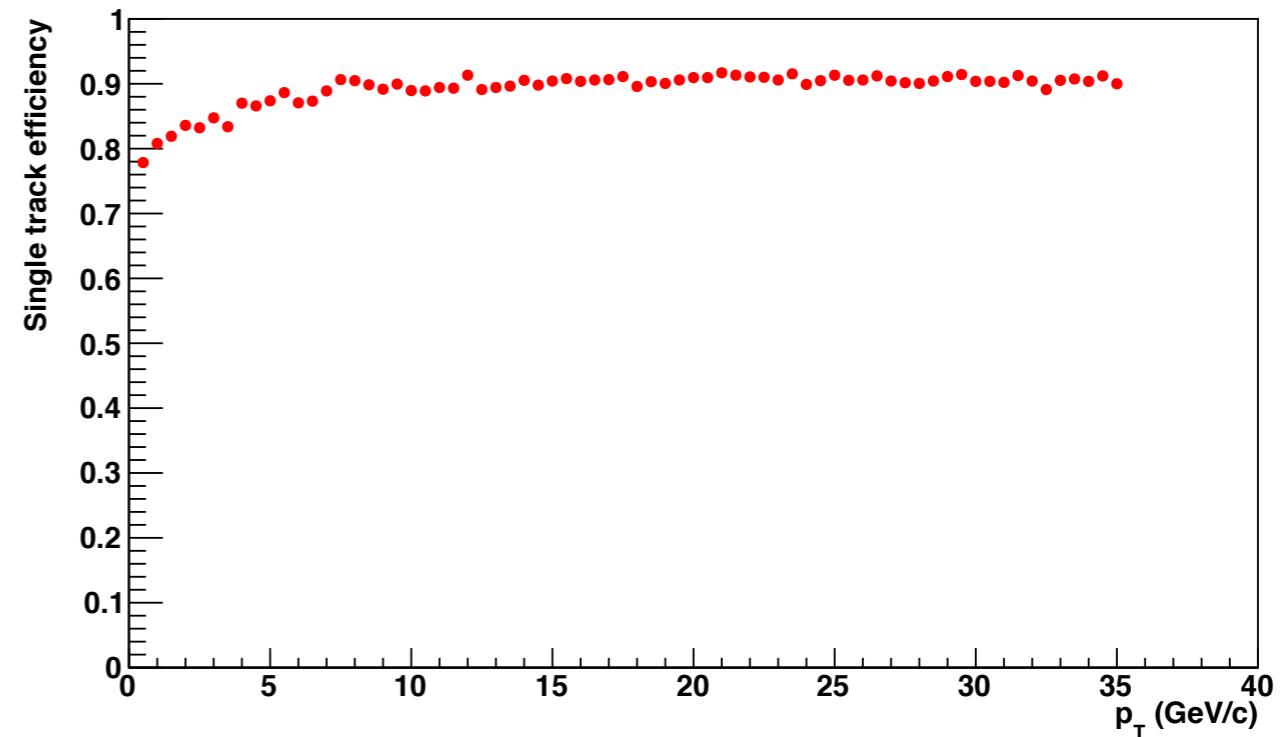


# Maps(3)+INTT(4)+TPC(60) performance plots



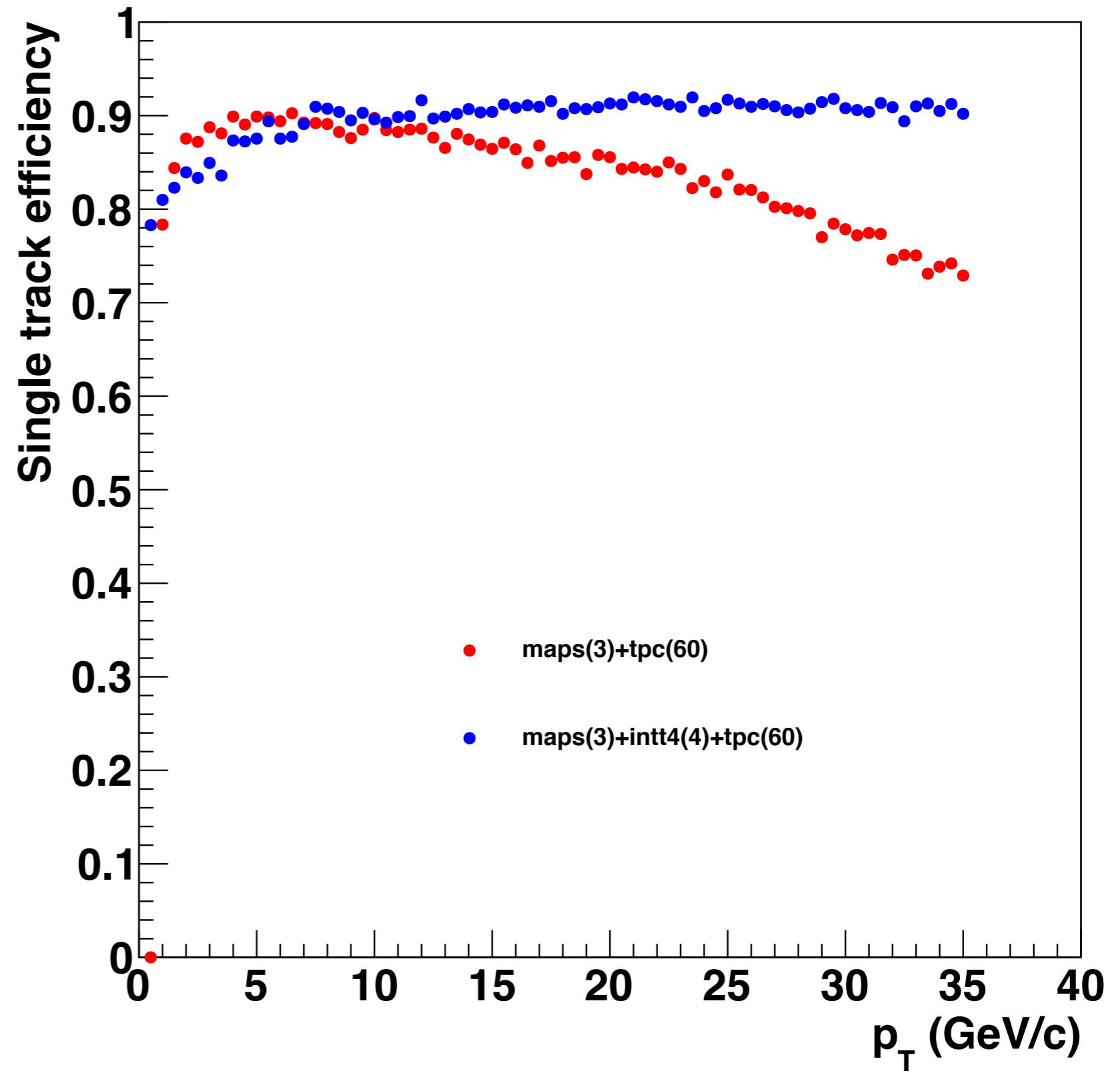
embedded pions only  
central Hijing  
+ 100 pions/event

quality < 1.5  
 $\Delta p_T < 4\sigma$



# Comparisons

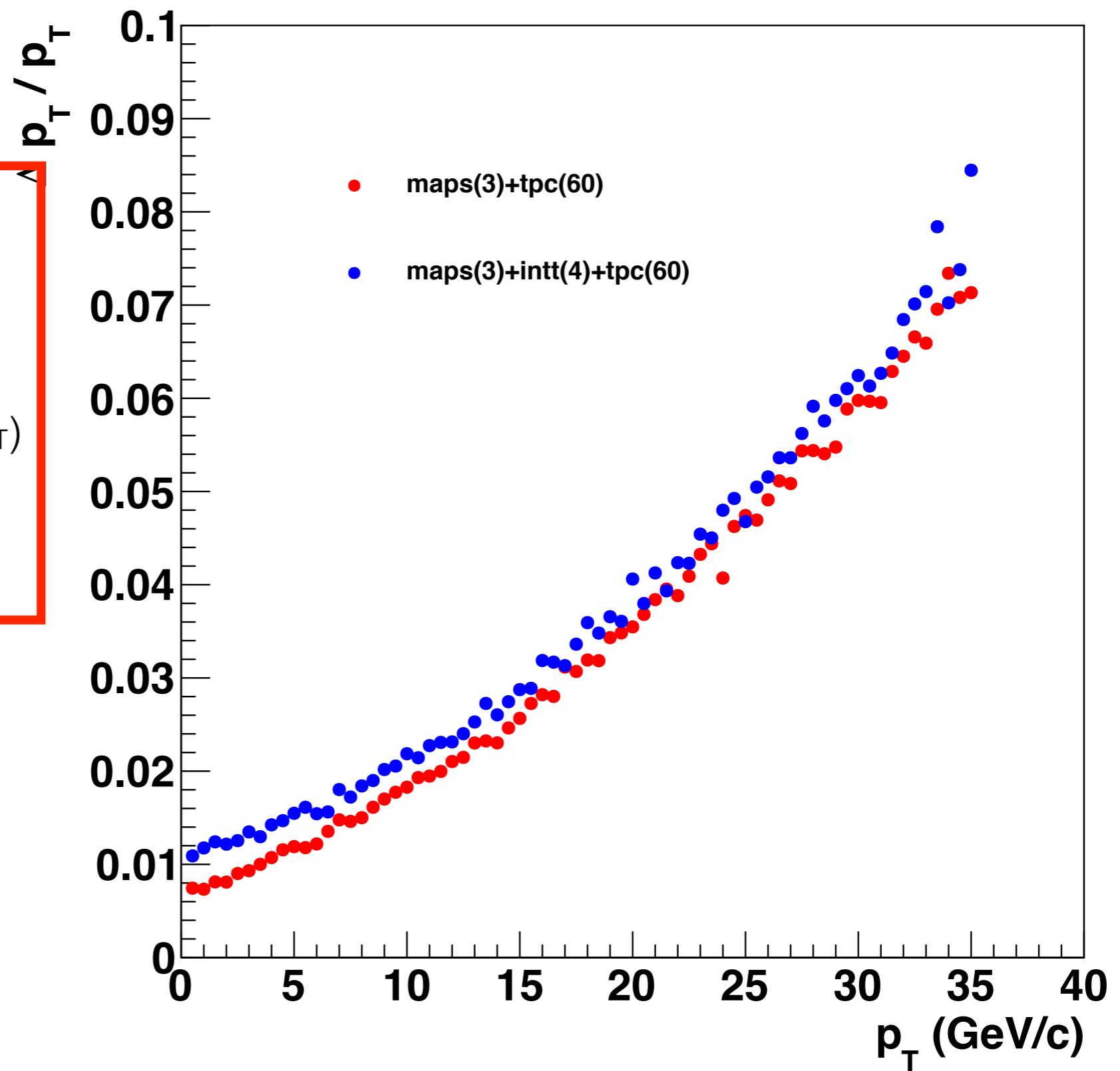
Fraction of **truth**  
tracks  
reconstructed  
within  $4\sigma$  in  $p_T$



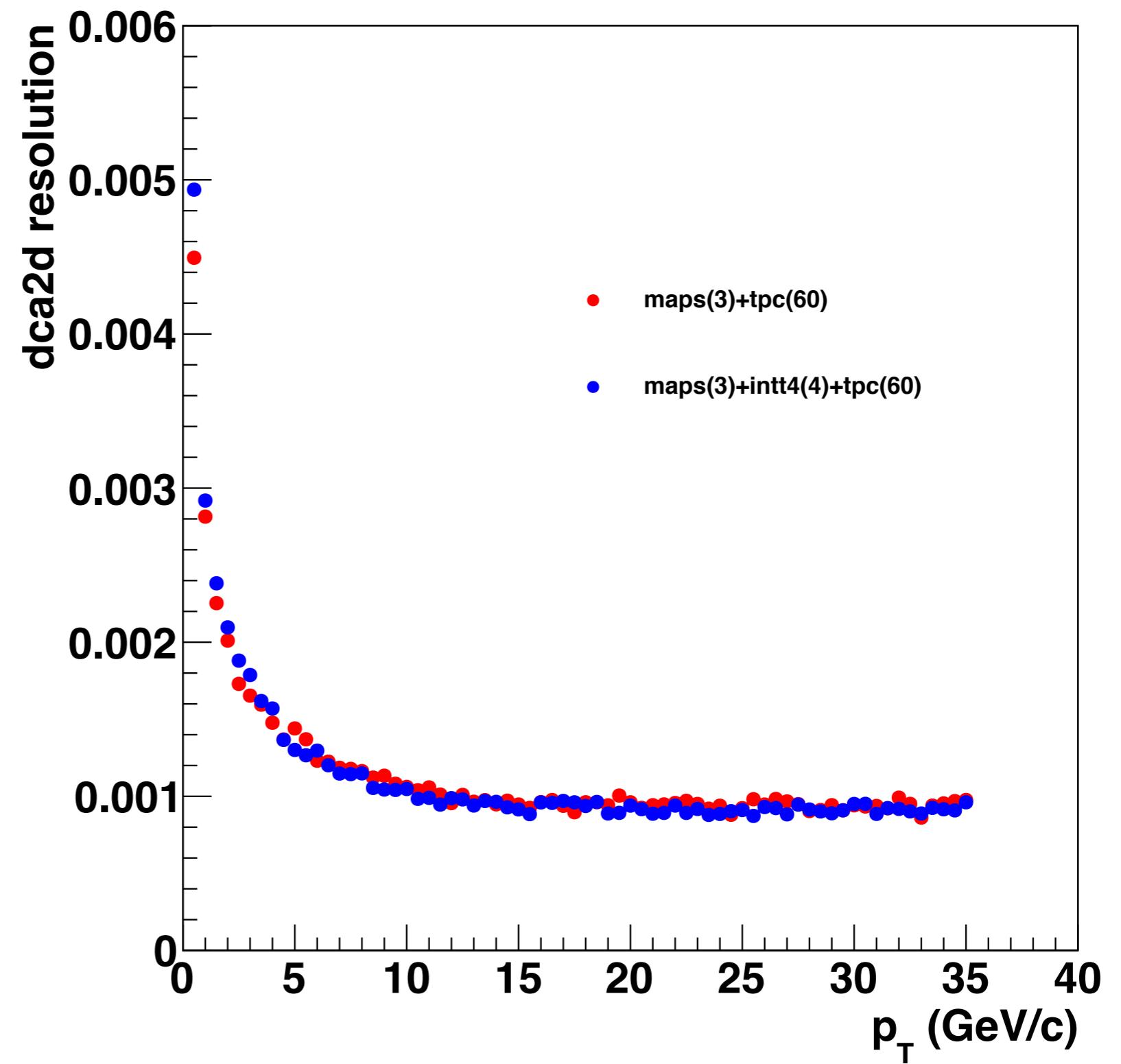
# Comparisons

Fits to  
distributions of

(truth  $p_T$  - reco  $p_T$ ) / (truth  $p_T$ )

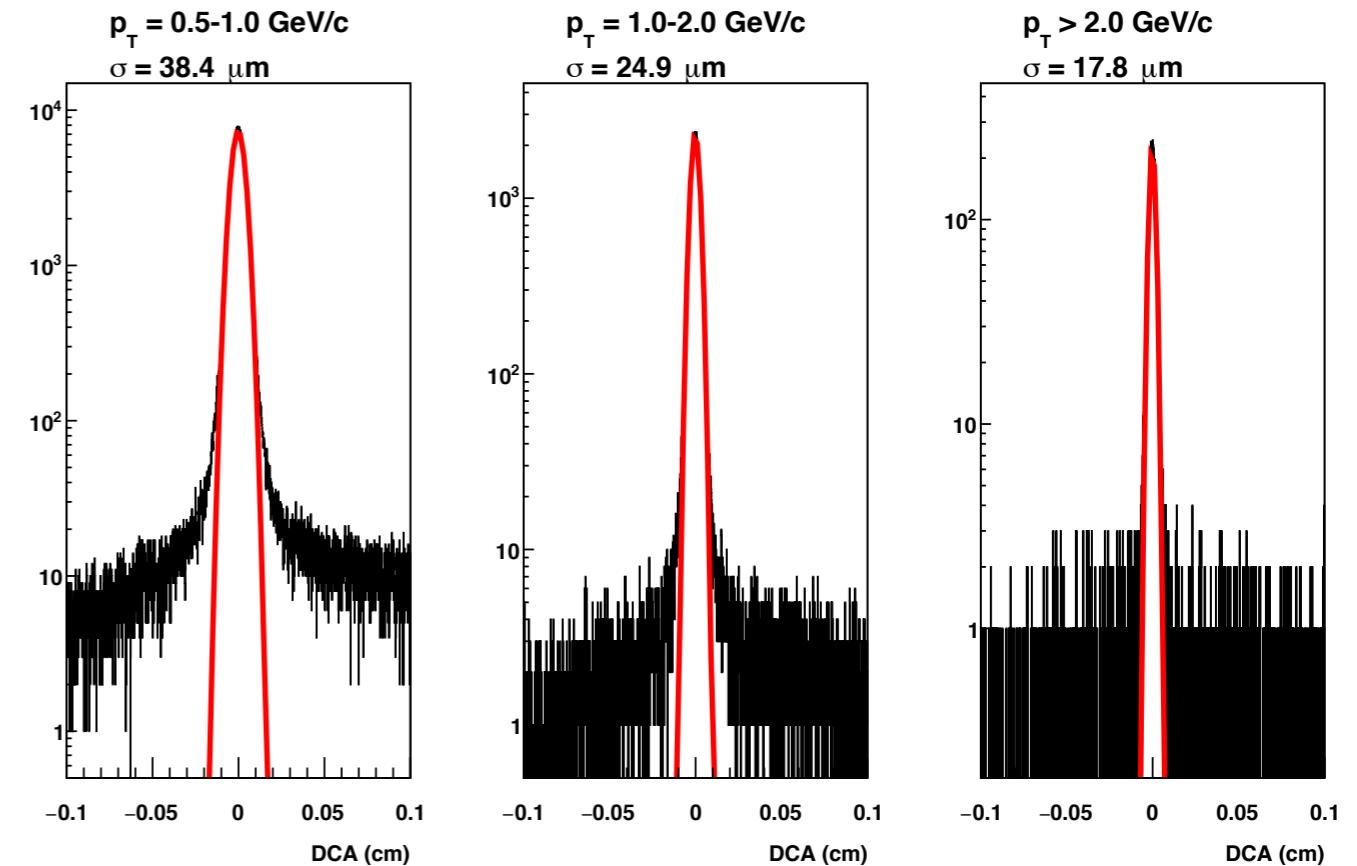


# Comparisons

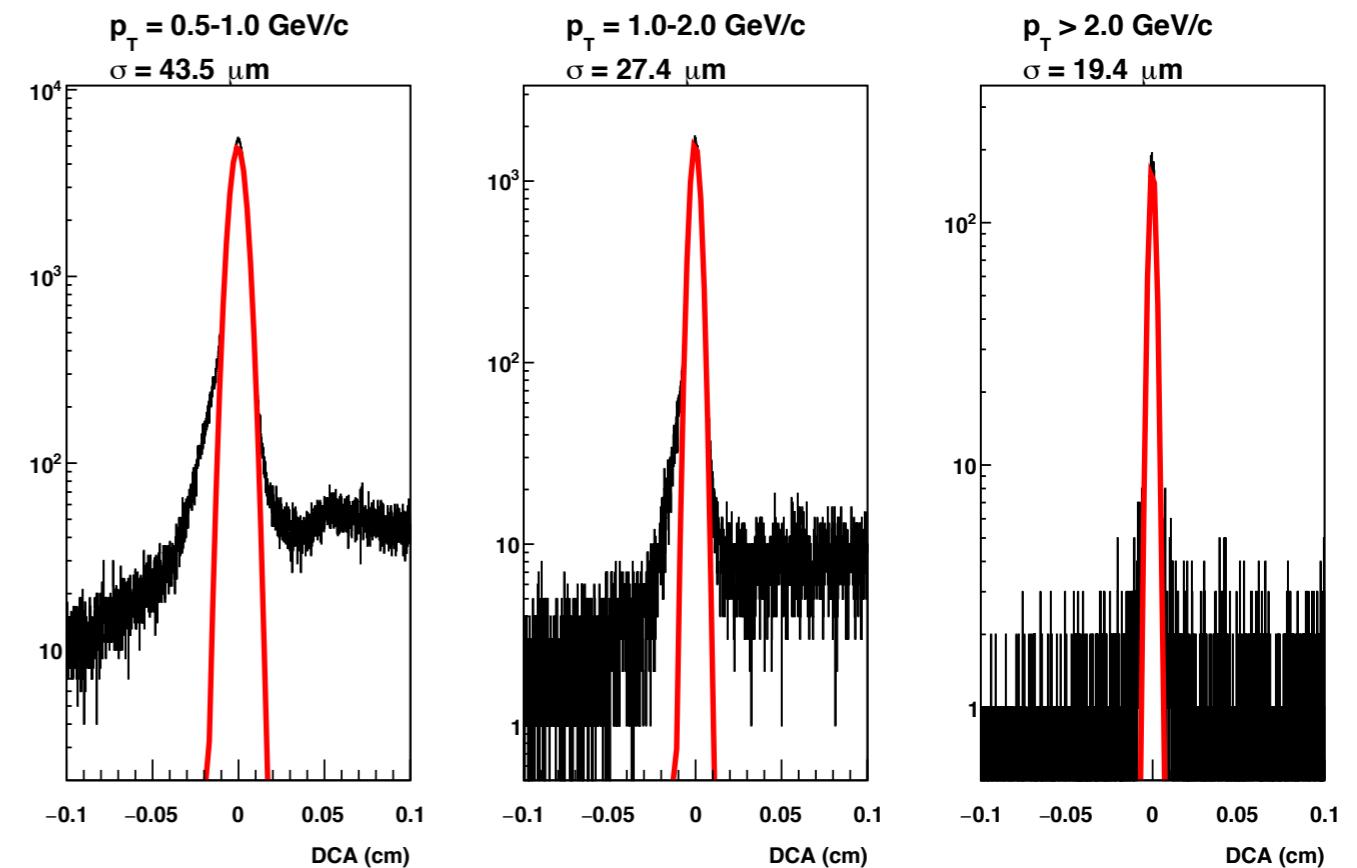


# DCA comparison (Hijing tracks only)

maps(3) + tpc(60)



maps(3) + intt(4) + tpc(60)



# Purity comparison (Hijing tracks only)

maps(3) + tpc(60)

Fraction of  
reconstructed  
tracks within  $4\sigma$   
of truth  $p_T$

maps(3) + intt(4)  
+ tpc(60)

